

REMARKS

In response to the official action:

The Examiner objects to the drawing for not showing lights deployed in line shapes.

New drawing Fig. 12 shows a line-shape in schematic form. The line shape is supported at page 18, line 21 in the specification.

Claims 3, 5, 13, and 23 are rejected under 35 U.S.C. §112, first paragraph, for failing to comply with the written description requirement.

The Examiner asserts that cream solder shaped as a truncated pyramid is not supported in the specification or drawing. The Applicants request reconsideration on the basis that the formula on page 15, line 5 must refer to a pyramidal shape because it relates the areas of a rectangular top face (c_1 times d_1) and the area of a rectangular bottom face (c_2 times d_2) to the volume, and because it includes a factor of $1/3$. The mathematical formula for the volume of a pyramid is $V = Ah/3$, where A is the area of the bottom face and h is the height from the base to the apex. The formula at page 15, line 5 has the form $Aah/3$, where a is the area of the top face, and approximates the volume of a truncated pyramid with a fixed slope of the sides, because the height of the missing top portion is proportional to $\sqrt{a/A}$.

The Examiner is invited to consider the last three lines on page 11, referring to “a trapezoid having a rectangular bottom face,” and the last paragraph on page 14, which also refers to a trapezoidal form. As the Examiner knows, the lateral face of a truncated pyramid is a trapezoid.

Claims 2, 4, 6, and 16 are rejected under 35 U.S.C. §112, second paragraph, for being indefinite. The claims are amended and withdrawal of the rejection is requested. The rejection is respectfully traversed as to claim 16, and clarification is requested.

Claims 1, 4, 7-11, 17, 18, 20, 21, 24, and 25 are rejected under 35 U.S.C. §102(e) as being anticipated by Ludlow (U.S. Patent 6,201,892). This rejection is respectfully traversed.

The Examiner asserts that the solder is alternately irradiated with light from illumination directions (96 and 26) in Fig. 10 of Ludlow , and further asserts that Fig. 10 clearly shows that the illumination directions are substantially perpendicular to a viewing direction.

The Applicants strenuously contest the assertion that Ludlow discloses illumination by one of the two directions being perpendicular to the printed circuit board. It is true that the light coming from the *original* direction 96 is in opposed relationship to the left-hand light beam 26. However, the illumination *per se* of the protruding reflective object 12 is effected from a direction perpendicular to the article 14, due to the presence of the beam splitter 94.

The Examiner is seen to put too much stress on the existence of the original direction 96 of light from the lamp 92, which is perpendicular to the viewing direction.

With respect, the Applicants see that in Fig. 10 the solder is irradiated by a light beam 26 from a first direction perpendicular to the viewing direction and another light beam coming from the direction parallel to the viewing direction. This relationship does not anticipate “at least two illumination directions opposing each other in a single plane extending substantially parallel to the printed circuit board in close proximity thereto,” as is now claimed.¹

¹ It is noted that claim 1 recites opposed illumination directions for “irradiating the cream solder,” and therefore the claimed directions are defined relative to light hitting the solder. The original direction of the light, prior to reflection from a beam splitter, is respectfully submitted to be irrelevant to the claimed subject matter.

In the structure of Ludlow, it is impossible to gain information about each side inclined portion of the solder in an opposed relationship.

Claims 5 and 14 are rejected under 35 U.S.C. §102 as being anticipated by Ngoi (U.S. Patent 6,525,331). This rejection is respectfully traversed.

The Examiner also asserts that Ngoi discloses irradiating light from opposed directions. However, Ngoi's directions make a right angle at most, and "opposed" is believed to imply a greater angle. For example, two forces at right angles acting on one body will affect the body independently, and therefore will not oppose one another at all.

Claims 13 and 23 are rejected under 35 U.S.C. §103 as being unpatentable over Ludlow.

The Examiner asserts that the shape of the solder is inherently obvious. This is respectfully traversed on the basis that Ludlow neither discloses the claimed shape nor suggests varying the shape of its illuminated objects. Ludlow images solder balls by reflection highlights at about 45° from the spherical center of each solder ball (e.g., Fig. 6), and does not disclose any shape having a fixed inclination of the sides. The Applicants relate inclination to luminance (page 17, last paragraph), and this is not suggested by the reference.

Claims 12, 15, 16, 19, 22, are 26 would be allowed if made independent.

These claims, that all recite that the illumination direction is from 5-10 mm elevation above a substrate, are not made independent at this time pending the Examiner's consideration of the claim language, "two illumination directions opposing each other in a single plane extending

substantially parallel to the printed circuit board in close proximity thereto, said irradiated light hitting the cream solder.”

Withdrawal of the rejection and allowance of all claims is requested.

Respectfully submitted,

ARMSTRONG, KRATZ, QUINTOS
HANSON & BROOKS, LLP



Nick Bromer
Registration No. 33,478
(717) 426-1664, voice and fax

Address: Atty. Docket 010893
Armstrong, Kratz, Quintos, Hanson & Brooks, LLP
1725 K Street, NW
Suite 1000
Washington, DC 20006

Tel. No.: (202) 659-2930, voice; (202) 887-0357, fax